Designing Studies Checkpoint 1

Question (1)

The most important reason for the use of random allocation of subjects to the different treatments is:

A: to ensure that each subject in the trial receives the best possible treatment.

B: to guarantee that approximately the same number of subjects is assigned to each treatment group.

C: to protect the experimenters from legal action in the event that the experiment goes drastically awry.

D: to ensure that the different treatment groups are as similar as possible in every way ***except*** for the treatment received.

E: to guarantee that the results of the experiment can never be duplicated.

Feedback

A : 0

✗ This is not quite right. Remember that ”treatments” in a study don’t necessarily refer to making the subjects "better," and random allocation wouldn’t ensure that anyway. Think about the other choices. (D) is the right answer.

B : 0

✗ This is not quite right. Although it’s true that random allocation would ensure roughly the same number of subjects per treatment group, that’s not the ***most important*** reason for the random allocation. Think about the other choices. (D) is the right answer.

C : 0

✗ This is not quite right. Random allocation in a study is important for a reason involving the interpretation of the results, not for legal protection; and random allocation wouldn’t ensure legal

✗ protection, anyway. Think about the other choices. (D) is the right answer.

D : 10

✓ Good job! By ensuring that the treatment groups are as similar in every possible way except for the imposed treatment, random allocation ***eliminates lurking variables***, and thus allows conclusions of ***causation***.

E : 0

✗ This is not quite right. Random allocation doesn't prevent the experimental results from being replicated by other researchers. If it did, we wouldn't do it, since replication is important to verify experimental results. Think about the other choices. (D) is the right answer.

Question (2)

It is known that in the United States, well-educated people are less likely to smoke. But what about other nations, where there may be different cultures and/or attitudes towards smoking? In a 1998 study of the relationship between education and smoking in France, a random sample of 334 French men was classified according to their education level (elementary, high-school, or university) and their smoking habits (smoker or non-smoker).

Which of the following is correct?

A: This study is an experiment, since each subject was classified into one of the six possible combinations of education level and smoking habits.

B: This study is an experiment, since it was based on a random sample.

C: This study is an observational study, since researchers did not assign the men to be smokers or non-smokers, or to one of the education levels.

D: This study is a combination of both an experiment and an

observational study.

Feedback

A : 0

✗ This is not quite correct. Remember that merely having subjects classified according to variables isn't enough to make something an ***experiment***. Think about the other choices. (C) is the right answer.

B : 0

✗ This is not quite correct. Remember that the ***sampling*** method isn't what determines whether something is an experiment. Think about the other choices. (C) is the right answer.

C : 10

✓ Good job! A study is ***experimental*** if the researchers ***assigned*** the subjects to different values of the explanatory variable, and it's ***observational*** otherwise. In this case, since subjects were only classified according to their own personally-decided smoking habits, and since their education level also certainly wasn't assigned by the researchers, this study was observational.

D : 0

✗ This is not quite correct. A study cannot be a mix of experiment and observation. A study is ***experimental*** if the researchers ***assigned*** the subjects to the explanatory variable, and it's ***observational*** otherwise. Think about the other choices. (C) is the right answer.

Question (3)

In an experiment to see if aspirin reduces the chance of having a heart attack, a placebo is:

A: the place where the subjects go when they have a heart attack.

B: a dummy pill that looks like aspirin but has no active

ingredients.

C: a procedure for deciding who gets the aspirin treatment.

D: the sampling method.

E: the randomization procedure.

Feedback

A : 0

✗ This is not quite right. The word "placebo" doesn't refer to a "place." Think about the other choices. (B) is the right answer.

B : 10

✓ Good job! A placebo is a non-active treatment used in a study for proper comparison. In this case, it ensures that any comparative effect in the aspirin group is really due to the active ingredient, rather than just due to the "placebo effect."

C : 0

✗ This is not quite right. A placebo isn't a "procedure," and it doesn't determine who gets the treatment. Think about the other choices. (B) is the right answer.

D : 0

✗ This is not quite right. A placebo isn't a sampling method. Think about the other choices. (B) is the right answer.

E : 0

✗ This is not quite right. A placebo isn't a "procedure," and it doesn't cause randomization. Think about the other choices. (B) is the right answer.

Question (4)

The main advantage of experiments over observational studies is that:

A: a well-designed experiment can give good evidence that the treatment actually causes the response.

B: an experiment can compare two or more groups.

C: an experiment is always cheaper.

D: an experiment is always shorter.

E: we can include more than one explanatory variable in the study.

Feedback

A : 10

✔ Good job! An ***experiment*** is a study where the treatments are ***assigned by the researchers***. This allows the possibility of random assignment, which ***eliminates lurking variables*** and thus allows ***causation*** to be determined.

B : 0

✘ This is not quite right. Observational studies can also compare groups. Merely having comparison of groups isn't what makes something an ***experiment***. Think about the other choices. (A) is the right answer.

C : 0

✘ This is not quite right. An ***experimental*** study is not necessarily cheaper than an ***observational*** study; and cost-savings wouldn't be the most important benefit, anyway. Think about the other choices. (A) is the right answer.

D : 0

✘ This is not quite right. An ***experimental*** study is not necessarily shorter in duration than an ***observational*** study; and time-savings wouldn't be the most important benefit, anyway. Think about the other choices. (A) is the right answer.

E : 0

✘ This is not quite right. Observational studies can also have more than one explanatory variable. The number of explanatory variables isn't what makes something an ***experiment***. Think about the other choices. (A) is the right answer.

Question (5)

Students in a large statistics class were randomly divided into two groups. The first group took the midterm exam with soft music playing in the background while the second group took the exam with no music playing. The exam scores of the two groups were then compared.

This experiment was not blind because:

A: students were allowed to keep their eyes open while taking the exam.
B: the exam was too long.
C: the students knew whether or not music was playing while they were taking the exam.
D: some of the students did not study for the exam.
E: students were randomized into the two groups.

Feedback

A : 0

✗ This is not quite right. "Blinding" in study design does not refer to whether the subjects can ***literally*** see. The word is used in a metaphorical sense. Think about the other choices. (C) is the right answer.

B : 0

✗ This is not quite right. "Blinding" in study design has nothing to do with the length of the study. Think about the other choices. (C) is the right answer.

C : 10

✓ Good job! "Blinding" in study design is when the subjects don't know which treatment they're getting. In this case, the treatments are background music or no background music. The students would certainly be aware of whether music was playing during the exam, so they would know which treatment they got.

D : 0

✗ This is not quite right. "Blinding" in study design does not refer to whether the students know the answers on the exam. It refers to whether the subjects are aware of something else pertaining to the study. Think about the other choices. (C) is the right answer.

E : 0

✗ This is not quite right. Having two randomized groups isn't what determines whether or not a study is "blind." Think about the other choices. (C) is the right answer.

Question (6)

To test an herbal treatment for depression, 100 volunteers who suffered from mild depression were randomly divided into two groups. Each person was given a month's supply of tea bags. For one group, the tea contained the herb mixed with spice tea, whereas for the other group, the bags contained only the spice tea. Participants were not told which type of tea they had, and were asked to drink one cup of tea per day for a month. At the end of the month, a psychologist evaluated them to determine if their mood had improved. The psychologist did not know which of the subjects had the tea with the herbal ingredient added.

Which is true regarding this study?

A: This study is an observational study.
B: This study is double-blind.
C: The "only spice tea" group serves as the control group.
D: All of the above are true.
E: Both (B) and (C) are true.

Feedback

A : 0

✗ This is not quite right. Remember that a study is ***observational***

when the researcher ***doesn't*** play any role in determining what treatment each subject might get. But in the study described, the researchers assigned each subject which tea to use, so the study wasn't observational. Think about the other choices. (E) is the right answer.

B : 0

Almost! It's true that the study is double-blind, because the subjects didn't know which tea they got (which protects against the placebo effect), and the psychologist also didn't know (which helps guard against researcher bias). But there is another choice that is also true. (E) is the right answer.

C : 0

Almost! It's true that the "only spice tea" group serves as the control group, because they didn't get any active herbal ingredient. But there is another choice that is also true. (E) is the right answer.

D : 0

This is not quite right. One of the choices isn't true for the study described. Re-read the choices again. (E) is the right answer.

E : 10

Good job! The study is double-blind, because the subjects didn't know which tea they got (which protects against the placebo effect), and the psychologist also didn't know (which helps guard against researcher bias). In addition, the "only spice tea" group serves as the control group because they didn't get any active herbal ingredient.

Question (7)

For their 1992 study "The Effect of Country Music on Suicide" (published in *Social Forces*, vol. 71, p. 211), researchers Stack and Gundlach investigated various American communities, recording the number of minutes of daily radio airtime devoted to

country songs and the suicide rate. They found a moderately strong positive correlation.

In their paper, the researchers explain the results by saying that "…the themes found in country music ***foster*** a suicidal mood ..." (emphasis added). A news headline (The Independent [London], October 1, 2004, p. 15) about the research echoed these sentiments when it said, "Strange But True: Country Music Saps Will to Live." The research is even cited on various suicide-prevention websites, some with headings such as "Country Music Increases Suicide Risk."

Based on this study, can we have confidence in causality between country music and suicide?

A: Yes, as long as the communities were sampled randomly, and the number of communities (the sample size) was sufficiently large.
B: Yes, causality is indicated by the moderately strong correlation.
C: Yes, since different communities listened to different levels of country music, meaningful experimental comparisons can be made.
D: No, because the lack of assignment of communities to different levels of country music listening means there is a possibility of lurking variables.
E: No, causality can only be demonstrated by investigating the entire population.

Feedback

A : 0

✗ This is not quite right. The ***sampling*** method only determines whether the relationship seen in the study can be generalized to the population (within the uncertainty of natural variability), but not whether the relationship demonstrates causation or merely association. The sample ***size*** only helps to determine the uncertainty due to natural variability, but not whether the relationship demonstrates causation. Think about the other choices. (D) is the right answer.

B : 0

✗ This is not quite right. The correlation only measures the

✗ strength of the relationship, but it doesn't indicate whether the relationship demonstrates causation. Think about the other choices. (D) is the right answer.

C : 0

✗ This is not quite right. Only ***experiments*** can determine causation, but it's not merely having comparisons that makes something an ***experiment***. There can be comparisons in observational studies, too. Think about what determines whether a study can determine causation. (D) is the right answer.

D : 10

✓ Good job! ***Causation*** can only be determined if the ***explanatory variable is randomly assigned***. But in this case, the researchers didn't randomly assign different amounts of country music to be played in different communities. So the study design doesn't rule out lurking variables.

E : 0

✗ This is not quite right. The entire population doesn't need to be investigated to determine causation. A relationship can be determined to be causative based on the study design. Think about what determines whether a study can determine causation. (D) is the right answer.